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Artsiely

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(54) **MANIPULATIVE THREE-DIMENSIONAL PUZZLE**

(75) Inventor: **Eyal Artsiely**, Arvot Hayarden (IL)

(73) Assignees: **Bahry Uri Management Ltd.**, Tel Aviv (IL); **E.O. Artsiely Agriculture and Product Development Ltd.**, M.P. Arvot Hayarden (IL); **Arie Shpatz**, Kiryat Ono (IL); **Moshe Dolev**, Udim (IL)

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A63F 9/08 (2006.01)

(52) **U.S. Cl.** ..... **273/153 S**

(58) **Field of Classification Search** ..... 273/153 S, 273/153 R, 156

See application file for complete search history.

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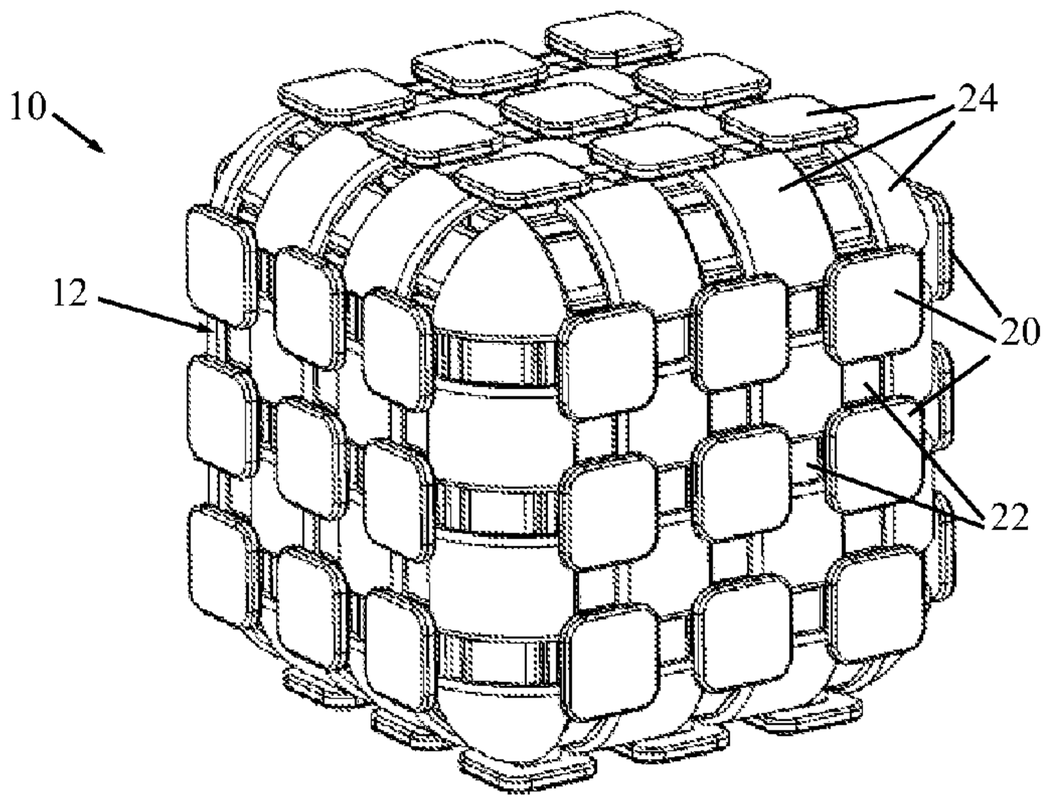
Primary Examiner — Steven Wong
(74) *Attorney, Agent, or Firm* — Dekel Patent Ltd.; David Klein

(57) **ABSTRACT**

A manipulative three-dimensional puzzle including a shell member formed with a plurality of tracks including a first set of tracks and a second set of tracks, the first and second sets of tracks intersecting each other at a plurality of crossroads, the first and second sets of tracks together extending at least partially over a height, length and width of the shell member, and a plurality of puzzle pieces and a plurality of spacers movably positioned in the first and second sets of tracks, wherein for each track at least one spacer is between two puzzle pieces, and wherein moving one of the puzzle pieces in one of the tracks causes all the puzzle pieces and spacers in that track to move together along that track.

15 Claims, 5 Drawing Sheets



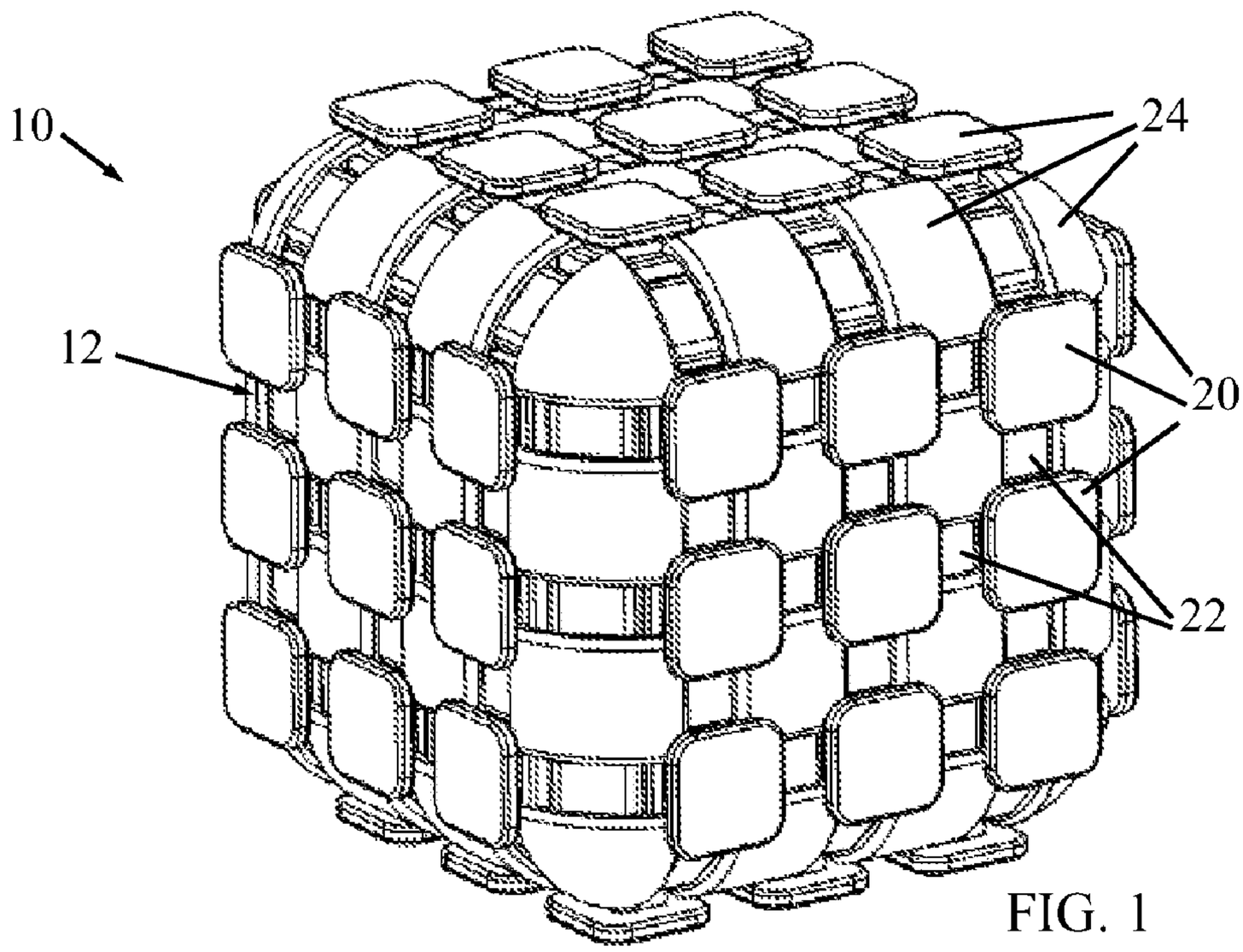


FIG. 1

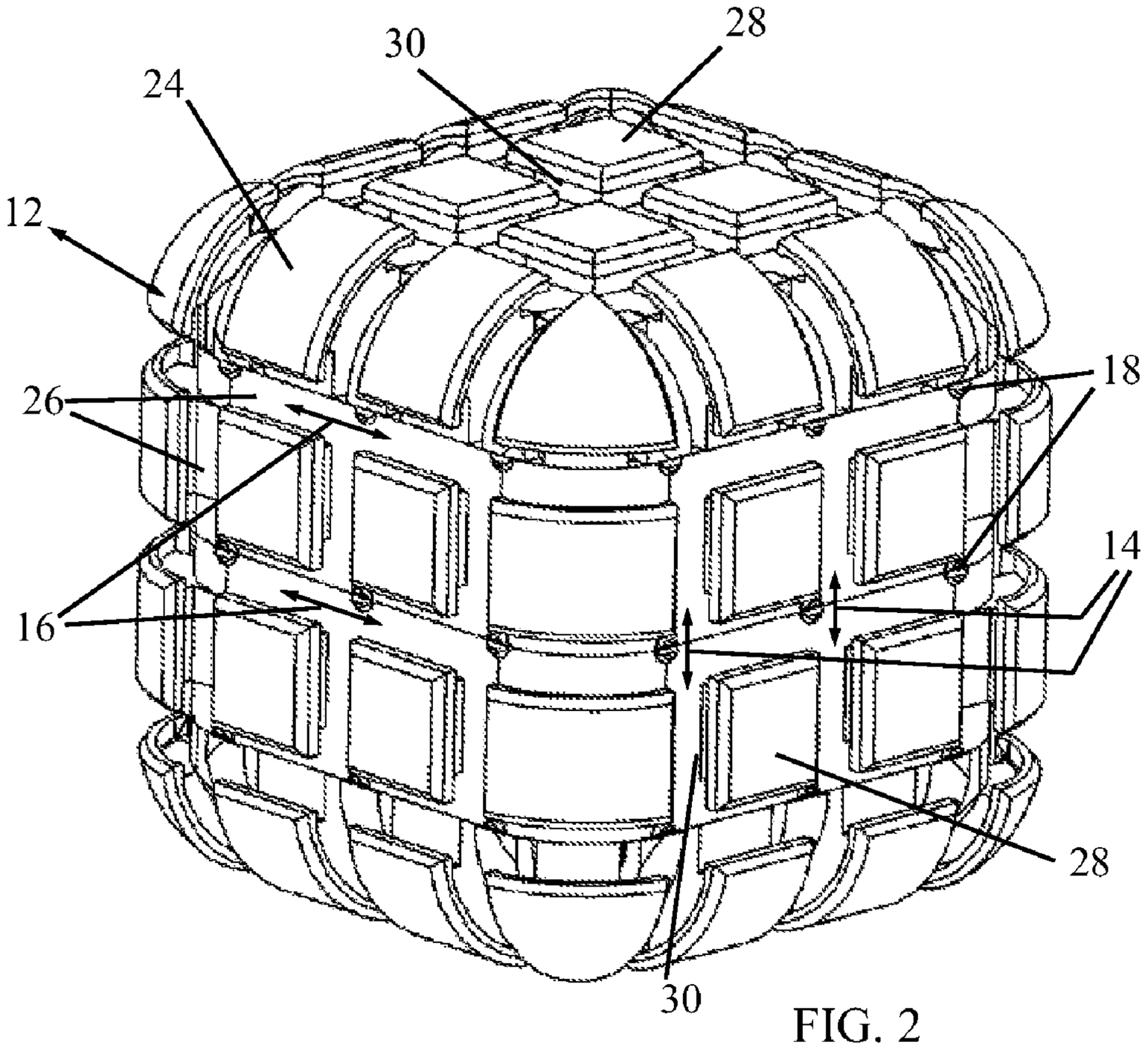


FIG. 2

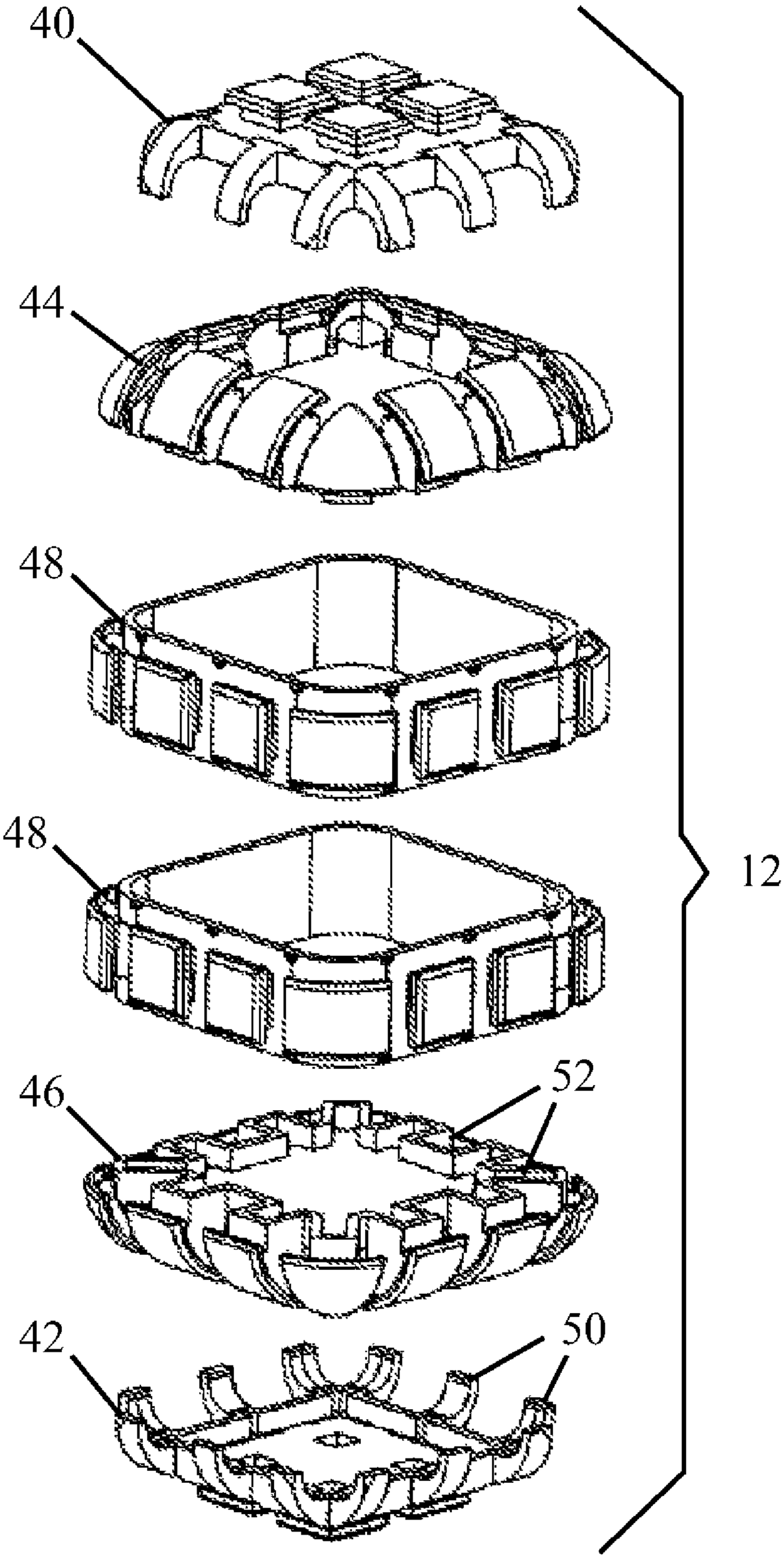


FIG. 3

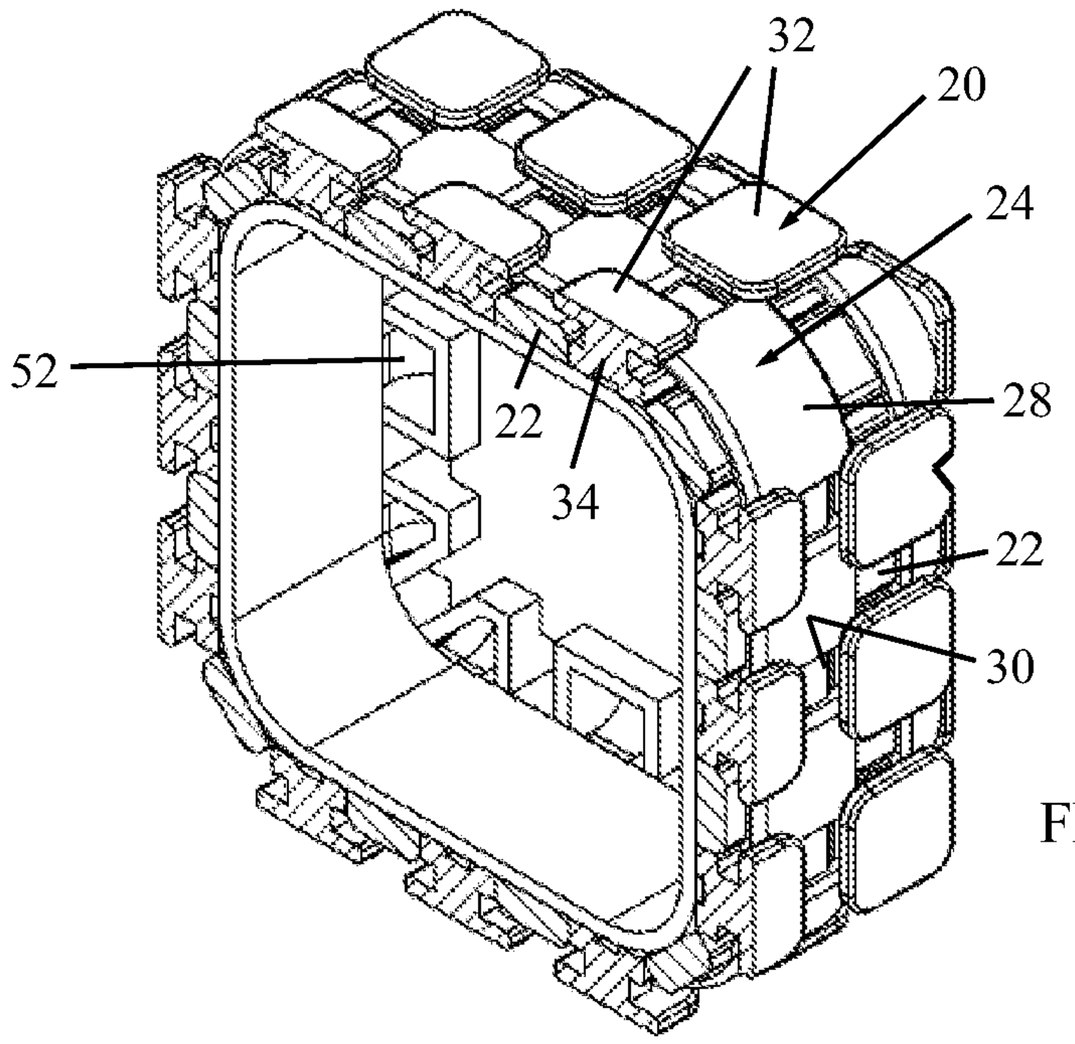


FIG. 4

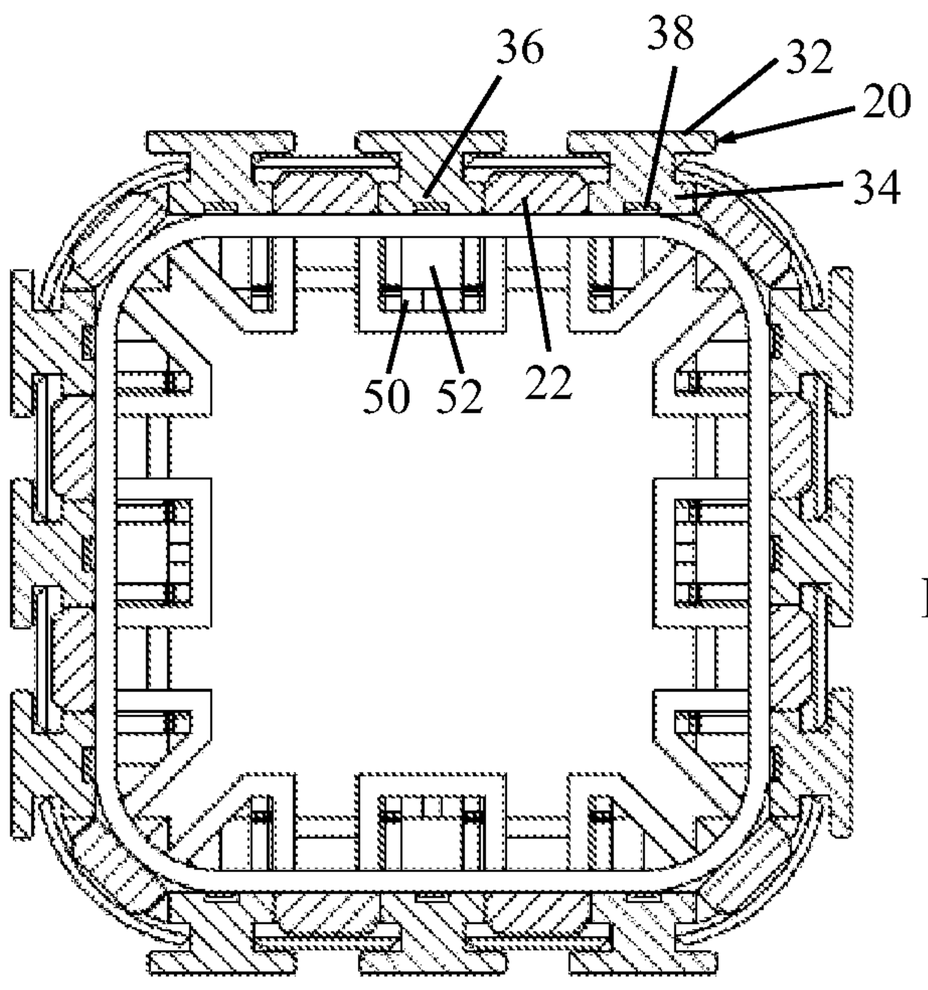


FIG. 5

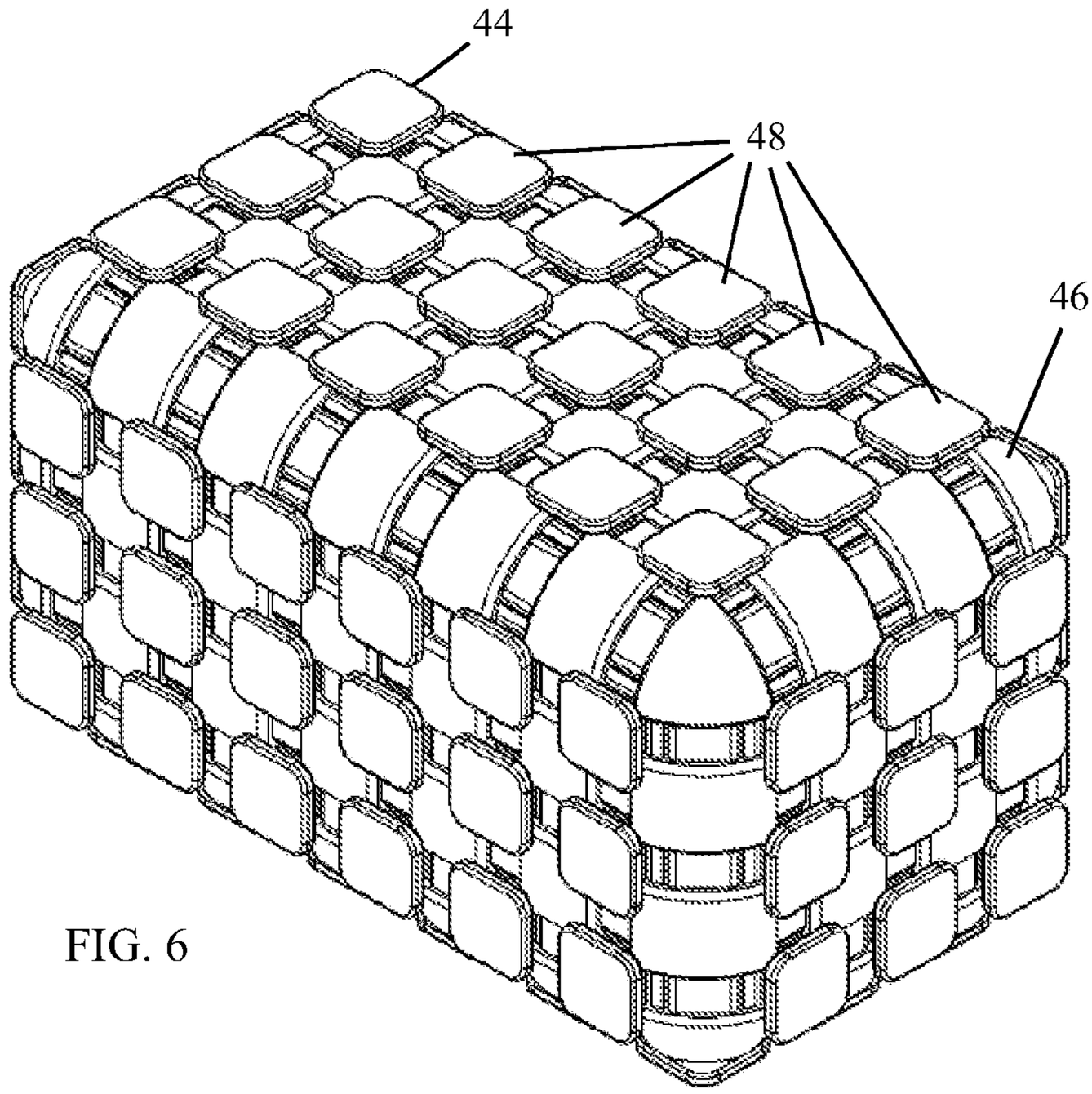


FIG. 6

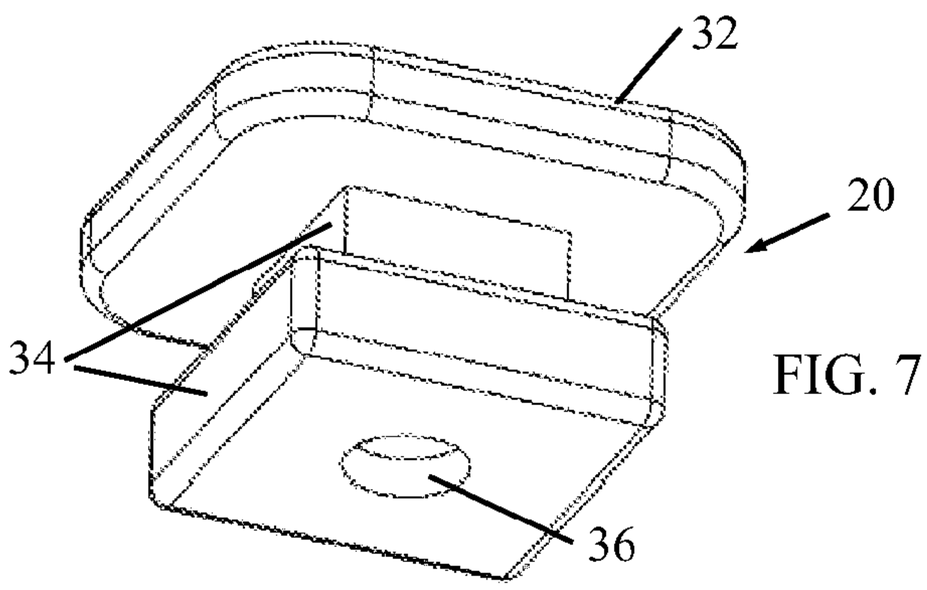


FIG. 7

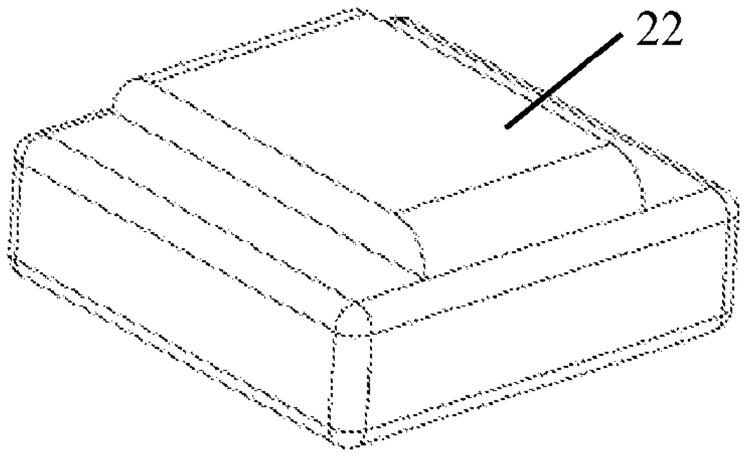


FIG. 8

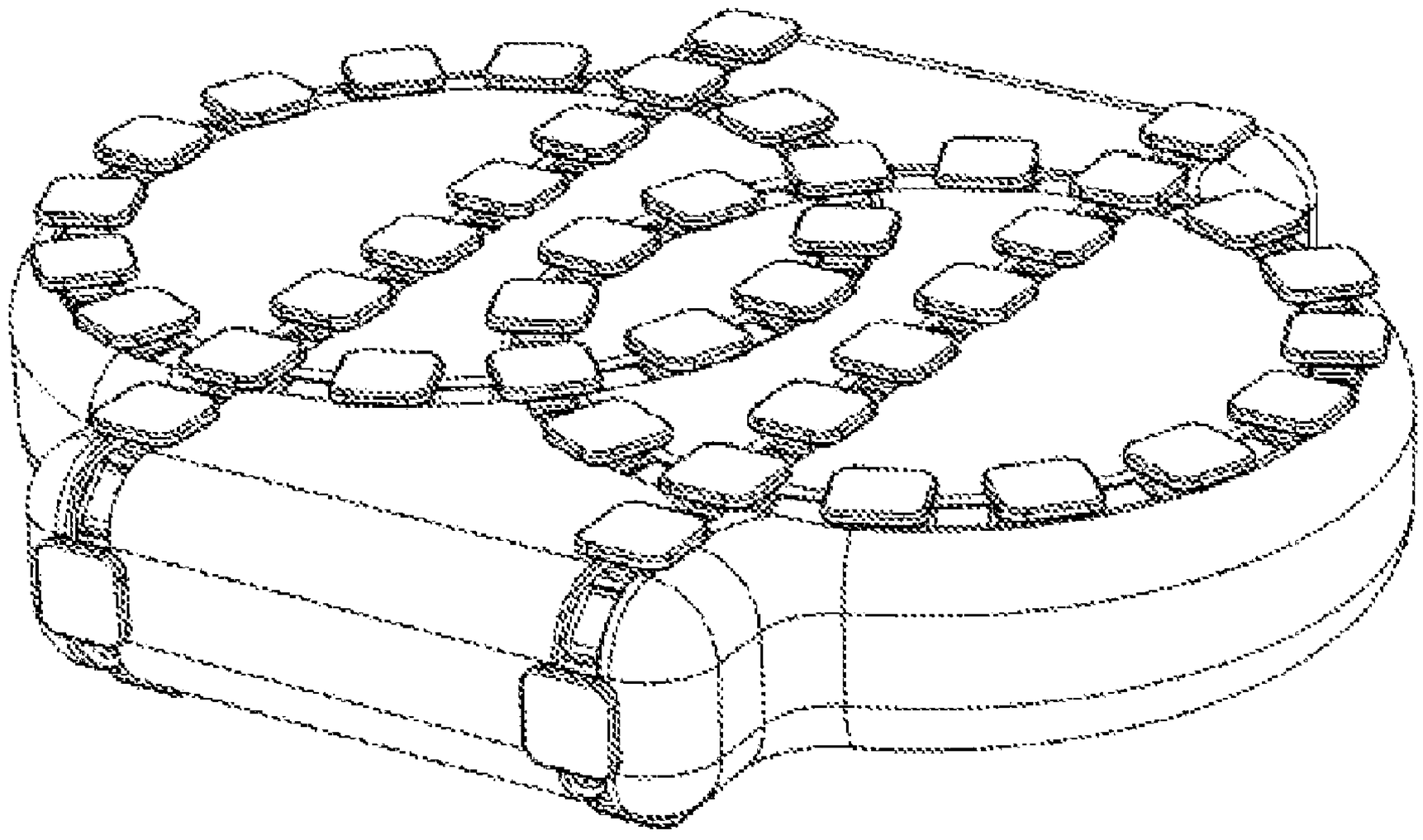


FIG. 9

MANIPULATIVE THREE-DIMENSIONAL PUZZLE

FIELD OF THE INVENTION

The present invention relates generally to three-dimensional rearrangement puzzles, and particularly to such a puzzle with pieces that move on tracks.

BACKGROUND OF THE INVENTION

As is well known in the art, Ernö Rubik created a puzzle shaped as a cube, which is subdivided into 27 smaller cubes arranged in rows, columns, and layers in a 3×3×3 pattern. Any face of the large cube may be rotated by 90°, 180°, and 270° and so forth, to form different configurations. The parts are held together by a series of axles, extensions and channels.

U.S. Pat. No. 4,452,454 to Greene describes a manipulative game. It has a substantially spherical support member which has a plurality of square members that can be manipulated about three different tracks carried on the support member. At the junction of two tracks, the squares can be shifted from one particular track to another.

SUMMARY OF THE INVENTION

The present invention seeks to provide an improved three-dimensional rearrangement puzzle with pieces that move on tracks, as is described more in detail hereinbelow. In the present invention,

There is thus provided in accordance with an embodiment of the present invention a manipulative three-dimensional puzzle including a shell member formed with a plurality of tracks including a first set of tracks and a second set of tracks, the first and second sets of tracks intersecting each other at a plurality of crossroads, the first and second sets of tracks together extending at least partially over a height, length and width of the shell member, and a plurality of puzzle pieces and a plurality of spacers movably positioned in the first and second sets of tracks, wherein for each track at least one spacer is between two puzzle pieces, and wherein moving one of the puzzle pieces in one of the tracks causes all the puzzle pieces and spacers in that track to move together along that track.

By "a first set of tracks" and "a second set of tracks" it is meant one or more first sets of tracks and one or more second sets of tracks.

In accordance with an embodiment of the present invention the first set of tracks are generally parallel to one another and the second set of tracks are generally parallel to one another.

In accordance with an embodiment of the present invention each set of tracks forms a continuous periphery about the shell member, and wherein moving one of the puzzle pieces in one of the tracks causes all the puzzle pieces and spacers in that track to move together along that track around the periphery of the shell member.

In accordance with an embodiment of the present invention the first and second sets of tracks are generally perpendicular to each other.

In accordance with an embodiment of the present invention the shell member includes a plurality of guide elements extending outwards therefrom, wherein gaps separate the guide elements from one another, the gaps forming the tracks in which the puzzle pieces and the spacers move.

In accordance with an embodiment of the present invention the each guide element includes a top portion extending from a base portion which extends outwards from the shell member, the top portion being larger in area than the base portion.

In accordance with an embodiment of the present invention each of the puzzle pieces includes an external top portion that extends from a pillar portion, wherein the pillar portion travels in the tracks.

In accordance with an embodiment of the present invention each of the puzzle pieces includes an external top portion that extends from a pillar portion, wherein the pillar portion travels in the tracks, and wherein the external top portion extends over adjacent top portions of each guide element, and wherein each spacer is disposed below the top portions of each guide element between adjacent base portions.

In accordance with an embodiment of the present invention each of the puzzle pieces is aligned at each of the crossroads with a tenon and a socket arrangement formed in the puzzle piece and the crossroad.

In accordance with an embodiment of the present invention the shell member includes first and second end cap members positioned at end faces of first and second corner members, respectively.

In accordance with an embodiment of the present invention the shell member further includes at least one longitudinal body member placed between the first and second corner members.

In accordance with an embodiment of the present invention the first and second sets of tracks are not perpendicular to each other.

In accordance with an embodiment of the present invention at least some of the puzzle pieces are differently colored, and/or differently shaped and/or have different indicia.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the drawings in which:

FIG. **1** is a simplified pictorial illustration of a puzzle including puzzle pieces and spacers that move in tracks, constructed and operative in accordance with an embodiment of the present invention;

FIG. **2** is a simplified pictorial illustration of the puzzle of FIG. **1**, without the puzzle pieces and spacers, showing tracks defined in a shell member, in accordance with an embodiment of the present invention;

FIG. **3** is a simplified exploded illustration of the shell member;

FIG. **4** is a simplified, cutaway pictorial illustration of part of the shell member;

FIG. **5** is a simplified, sectional illustration of part of the shell member;

FIG. **6** is a simplified pictorial illustration of the puzzle extended into an oblong shape, in accordance with a non-limiting embodiment of the present invention;

FIG. **7** is a simplified pictorial illustration of one of the puzzle pieces;

FIG. **8** is a simplified pictorial illustration of one of the spacers; and

FIG. **9** is a simplified pictorial illustration of a puzzle including puzzle pieces and spacers that move in tracks, constructed and operative in accordance with another embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

Reference is now made to FIGS. **1-3**, which illustrate a puzzle **10**, constructed and operative in accordance with a non-limiting embodiment of the present invention.

Puzzle **10** includes a shell member **12** formed with a plurality of tracks (seen best in FIG. **2**) including a first set of tracks **14** (longitudinal tracks in the drawings) and a second set of tracks **16** (latitudinal tracks in the drawings). The first and second sets of tracks **14** and **16** intersect each other at a plurality of crossroads **18**.

A plurality of puzzle pieces **20** and a plurality of spacers **22** (FIG. **1**) are movably positioned in the first and second sets of tracks **14** and **16**. For each track, there is at least one spacer **22** positioned between two puzzle pieces **20**. Moving one of the puzzle pieces **20** in one of the tracks **14** or **16** causes all the puzzle pieces **20** and spacers **22** in that track to move together along that track. As seen in the drawings, the first and second sets of tracks **14** and **16** together extend at least partially over a height, length and width of shell member **12**, thereby forming a three-dimensional puzzle.

In accordance with a non-limiting embodiment of the present invention (the illustrated embodiment in FIGS. **1-3**), the first set of tracks **14** are generally parallel to one another and the second set of tracks **16** are generally parallel to one another. The first and second sets of tracks **14** and **16** are generally perpendicular to each other. (FIG. **9** shows an embodiment wherein the first and second sets of tracks are not perpendicular to each other.)

In the embodiment of FIGS. **1-3**, each set of tracks **14** and **16** forms a continuous periphery about the shell member **12**. Accordingly, moving one of the puzzle pieces **20** in one of the tracks causes all the puzzle pieces **20** and spacers **22** in that track to move together along that track around the periphery of the shell member **12**.

Reference is now made particularly to FIG. **2** for the description of the structure of the tracks. In accordance with an embodiment of the present invention, shell member **12** includes a plurality of guide elements **24** extending outwards therefrom. Gaps **26** separate guide elements **24** from one another and these gaps **26** form the tracks in which the puzzle pieces and the spacers move.

In the illustrated embodiment, each guide element **24** includes a top portion **28** extending from a base portion **30** which extends outwards from shell member **12**. The top portion **28** is larger in area than the base portion **30**. As seen clearly in FIGS. **4**, **5** and **7**, each of the puzzle pieces **20** includes an external top portion **32** that extends from a pillar portion **34**. As seen clearly in FIGS. **4** and **5**, it is the pillar portion **34** that travels in the tracks. The external top portion **32** extends over adjacent top portions **28** of each guide element **24**. In contrast, each spacer **22** is disposed below the top portions **28** of each guide element **24** between adjacent base portions **30**.

Alternatively, the puzzle pieces **20** can be fashioned in other shapes. For example, the puzzle pieces can be made without the external top portion **32**. It is further noted that the pillar portion **34** can be of various shapes. The illustrated pillar portion **34** has a wider base but this also can be shaped in other ways.

In accordance with an embodiment of the present invention, each of the puzzle pieces **20** is aligned at each of the crossroads **18** with a tenon and a socket arrangement formed in the puzzle piece and the crossroad. In the illustrated embodiment, as seen clearly in FIGS. **5** and **7**, the puzzle piece **20** is formed with a socket **36** (e.g., small depression) and shell member **12** is formed with a tenon **38** (e.g., small protrusion—seen in FIG. **5**) at crossroad **18**. When the puzzle piece **20** is moved to the crossroad **18**, the tenon **38** "clicks" into socket **36**, so as to give a positive feel to the user that the puzzle piece **20** is correctly positioned at the crossroad **18**.

(Of course, alternatively, the puzzle piece may be formed with the tenon and the shell member may be formed with the socket.)

Reference is now made particularly to FIG. **3**. Shell member **12** includes first and second end cap members **40** and **42** positioned at end faces of first and second corner members **44** and **46**, respectively. One or more longitudinal body members **48** are placed between the first and second corner members **44** and **46**. Note that the corner and edge guide elements **24** of first and second corner members **44** and **46** (and of longitudinal body members **48**) are rounded to form round corners and edges of the finished three-dimensional structure. The different parts of shell member **12** may be secured together in any suitable manner, such as but not limited to, interlocking tenons **50** and sockets **52** (seen best in FIGS. **3**, **4** and **5**).

As seen in FIG. **6**, the three-dimensional structure can be made of a limitless length (box shape) by adding more and more longitudinal body members **48** are placed between the first and second corner members **44** and **46**.

At least some of the puzzle pieces can be differently colored (red, green blue, etc. or combinations of colors), and/or differently shaped (e.g., circular, oval, square [with rounded or sharp corners], triangular, animal shapes, irregular shapes, etc.) and/or have different indicia (e.g., numbers, letters, words, etc.).

The puzzle can be rearranged randomly, with the object being to restore the puzzle pieces to their exact original positions. This may form a pattern of colors, or a picture (like a jigsaw puzzle) or many other arrangements.

In accordance with an embodiment of the present invention, the puzzle can be a "virtual" puzzle, that is, instead of physical pieces, the parts of the puzzle can be displayed visually as a computer puzzle and manipulated by a user on the computer screen. The user can enter commands to a computer (e.g., PC, personal communication device, cell phone, etc.) which interprets the commands to move the puzzle pieces. Alternatively or additionally, codes (e.g., letters or numbers or both) can be assigned for each possible position of the puzzle pieces and these codes can be used to move the pieces by suitable commands to the computer. Alternatively or additionally, the physical puzzle can transmit the current status of the puzzle pieces, wired (e.g., USB or any other connection) or wireless (e.g., BLUETOOTH, infrared, RF, etc.) to a processor for displaying as a virtual puzzle. This may be accomplished, for example, by providing the puzzle pieces with sensors (e.g., accelerometers) that sense the spatial 3D orientation of the puzzle piece, wherein the data sensed by the sensors is transmitted by a transmitter to the processor, processed and interpreted as the spatial 3D orientation of the puzzle piece. The user can interrogate the computer for ways to solve the puzzle. The computer knows the positions of the pieces and can offer different possible moves to the user.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the present invention includes both combinations and subcombinations of the features described hereinabove as well as modifications and variations thereof which would occur to a person of skill in the art upon reading the foregoing description and which are not in the prior art.

What is claimed is:

1. A manipulative three-dimensional puzzle comprising:

a shell member formed with a plurality of tracks comprising a first set of tracks and a second set of tracks, the first and second sets of tracks intersecting each other at a plurality of crossroads, the first and second sets of tracks

together extending at least partially over a height, length and width of said shell member; and

a plurality of puzzle pieces and a plurality of spacers movably positioned in said first and second sets of tracks, wherein for each track at least one spacer is between two puzzle pieces, and wherein moving one of the puzzle pieces in one of the tracks causes all the puzzle pieces and spacers in that track to move together along that track, and wherein said spacers are shaped differently than said puzzle pieces;

wherein said shell member comprises a plurality of guide elements extending outwards therefrom, wherein gaps separate said guide elements from one another, said gaps forming the tracks in which said puzzle pieces and said spacers move;

wherein said each guide element comprises a top portion extending from a base portion which extends outwards from said shell member, said top portion being larger in area than said base portion; and

wherein each of said puzzle pieces comprises an external top portion that extends from a pillar portion, wherein the pillar portion travels in the tracks, and wherein the external top portion extends over adjacent top portions of each guide element, and wherein each spacer is disposed below the top portions of each guide element between adjacent base portions.

2. The puzzle according to claim **1**, wherein said first set of tracks are generally parallel to one another and said second set of tracks are generally parallel to one another.

3. The puzzle according to claim **1**, wherein each set of tracks forms a continuous periphery about said shell member, and wherein moving one of the puzzle pieces in one of the tracks causes all the puzzle pieces and spacers in that track to move together along that track around the periphery of said shell member.

4. The puzzle according to claim **1**, wherein said first and second sets of tracks are generally perpendicular to each other.

5. The puzzle according to claim **1**, wherein each of said puzzle pieces comprises an external top portion that extends from a pillar portion, wherein the pillar portion travels in the tracks.

6. The puzzle according to claim **1**, wherein each of said puzzle pieces is aligned at each of said crossroads with a tenon and a socket arrangement formed in the puzzle piece and the crossroad.

7. The puzzle according to claim **1**, wherein said shell member comprises first and second end cap members positioned at end faces of first and second corner members, respectively.

8. The puzzle according to claim **7**, wherein said shell member further comprises at least one longitudinal body member placed between said first and second corner members.

9. The puzzle according to claim **1**, wherein said first and second sets of tracks are not perpendicular to each other.

10. The puzzle according to claim **1**, wherein at least some of said puzzle pieces are differently colored.

11. The puzzle according to claim **1**, wherein at least some of said puzzle pieces are differently shaped.

12. The puzzle according to claim **1**, wherein at least some of said puzzle pieces have different indicia.

13. The puzzle according to claim **1**, wherein said puzzle has a virtual form for displaying and manipulating on a display device.

14. The puzzle according to claim **1**, wherein each of said puzzle pieces comprises a sensor that senses a spatial 3D orientation of the puzzle piece, and further comprising a transmitter operative to transmit data sensed by said sensors for displaying as a virtual puzzle.

15. The puzzle according to claim **13**, wherein a code is assigned for a position of said puzzle pieces, wherein said puzzle pieces are moved in accordance with said code.

* * * * *